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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/669,065	09/23/2003	Ali Shajii	56231-417 (MKS-131)	2723

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EXAMINER	
THOMPSON, JEWEL VERGIE	
ART UNIT	PAPER NUMBER
2855	

DATE MAILED: 06/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/669,065	SHAJII ET AL.	
	Examin r	Art Unit	
	Jewel V Thompson	2855	AU

-- The MAILING DATE of this communication appears on the cover she t with the correspond nc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,12-18 and 21-24* is/are rejected.

7)☒ Claim(s) *10,11,19 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/3/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgement is made of the Information Disclosure Statement filed May 3, 2004, which has been made record of and placed, in the file.

Claim Objections

2. Claim 8 and 9 are objected to because of the following informalities: The claims are misnumbered. There are two sets of claims 8 and 9. Examiner examined the 1st set and the second set was not examined at all. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 9, 12, 18 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Letton (6,550,345) in view of Fan et al (6,577,700).

Regarding claim 1, Letton teaches a method for determining a two phase flow rate of a fluid mixture through a vessel (col. 2, lines 12-23), the fluid mixture comprising at least a first fluid component characterized by a first phase and a second fluid component characterized by a second phase (col. 2, lines 24-28), the method comprising: obtaining a first approximate flow measurement and a second approximate

flow measurement by using a first and a second transducer sensor to transmit a wave through the fluid mixture and detect the transmitted wave (col. 9, lines 15-20); and computing two phase flow rate of the fluid mixture as a known function of the ratio p, the first and second flow measurements, and the direction and speed of transmission of the wave (col. 2, lines 36-38). Letton fails to teach performing tomograph measurement of the fluid mixture flowing through the vessel so as to determine a ratio p between the first component and the second component within the fluid mixture. Fan et al teaches, in the abstract and col. 9, lines 1 and 2, a new image reconstruction technique for imaging two-and three-phase flows using electrical capacitance tomography; and a method for obtaining a cross-sectional image of a two-phase fluid flowing through a conduit. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the image reconstruction technique of Fan et al in the apparatus of Letton for the purpose of capturing the real time data of the turbulent fluctuation in the flow field (col. 1, lines 48-50, Fan et al).

Regarding claim 2, Letton fails to teach the tomography measurement comprises an ECT (Electrical Capacitance Tomography) measurement. Fan et al teaches a new image reconstruction technique for imaging two-and three-phase flows using electrical capacitance tomography (abstract). It would have been obvious to one of ordinary skill in the art at the time that the invention was made to used the ECT (Electrical Capacitance Tomography) measurement technique of Fan et al in the apparatus of Letton for the purpose of capturing the real time data of the turbulent fluctuation in the flow field (col. 1, lines 48-50, Fan et al).

Regarding claim 3, Letton fails to teach the step of determining the ratio of the first component to the second component comprises the step of measuring a distribution of dielectric permittivity within the vessel. Fan et al teaches in col. 21, lines 27-32 that fig. 8, shows reconstruction results for three-phase flow system model employing gas bubbles and solid particles in oil with the relative permittivities of 1,6 and 2, respectively. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have measured the distribution of dielectric permittivity of the fluid as did Fan et al in the apparatus of Letton for the purpose of determining the ratios of the fluid, since each type of phase has a particular permittivity number associated with it.

Regarding claim 4, Letton fails to teach measuring the electrical capacitances between one or more pairs of electrodes placed around the periphery of a capacitance tomography unit. Fan et al teaches in col. 4, lines 29-31, the measured capacitance is a function of the dielectric constant permittivity filling the space between the electrodes in the pair. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the process of Fan et al in the apparatus of Letton for the purpose of determining the ratios of the phases in the fluid flow.

Regarding claim 5, Letton teaches at least one transducer sensor comprises an ultrasound sensor, and wherein the wave comprises an ultrasound wave (col. 3, lines 48-55).

Regarding claims 6 and 18, Letton teaches the at least one transducer sensor comprises: a) a first ultrasound sensor for providing the first flow measurement, and

b) a second ultrasound sensor for providing the second flow measurement, and wherein the wave comprises a first ultrasound wave propagating at an angle with respect to the direction of flow of the fluid mixture, and a second ultrasound wave propagating at another angle with respect to the direction of flow of the fluid mixture (col. 3, lines 64-68 – col. 4, lines 1-5, fig. 6).

Regarding claim 7, Letton teaches the first ultrasound sensor comprises a first ultrasound transmitter (120) for generating the first ultrasound wave and transmitting it through the fluid mixture, and a first ultrasound receiver (130) for receiving the transmitted ultrasound wave; and wherein the second ultrasound sensor comprises a second ultrasound transmitter (130) for generating the second ultrasound wave and transmitting it through the fluid mixture, and a second ultrasound receiver (120) for receiving the transmitted ultrasound wave (col. 3, lines 48-64).

Regarding claim 9 Letton teaches a method for determining a two phase flow rate of a fluid mixture through a vessel (col. 2, lines 21-23), the fluid mixture comprising at least a first fluid component characterized by a first phase and a second fluid component characterized by a second phase (col. 2, lines 24-28), the method comprising: B. transmitting a first ultrasonic wave through the fluid mixture, and measuring the speed (abstract) and direction of propagation of the first ultrasonic wave (col. 3 lines 64-67-col. 4, lines 1-5); C. transmitting a second ultrasonic wave through the fluid mixture, and measuring the speed and direction of propagation of the second ultrasonic wave (col. 3, lines 11-62); and D. computing the two phase flow rate of the fluid mixture using a known relationship between the two phase flow rate, the ratio p,

and the speed and direction of propagation of each ultrasonic wave relative to the direction of flow of the fluid mixture (c0l. 12, lines 44-47). Letton fails to teach performing a tomography measurement of the fluid mixture flowing through the vessel so as to determine a concentration ratio p of the first component to the second component in the fluid mixture. Fan et al teaches, in the abstract and col. 9, lines 1 and 2, a new image reconstruction technique for imaging two-and three-phase flows using electrical capacitance tomography; and a method for obtaining a cross-sectional image of a two-phase fluid flowing through a conduit. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to used the image reconstruction technique of Fan et al in the apparatus of Letton for the purpose of capturing the real time data of the turbulent fluctuation in the flow field (col. 1, lines 48-50, Fan et al).

Regarding claim 12, Letton teaches each of the first and second phases comprise at least one of: a solid; a liquid; and a gas col. 9, lines (col. 10, lines 51-57).

Regarding claim 13, Letton teaches a system for measuring a two phase flow rate of a fluid mixture flowing through a vessel, the fluid mixture containing at least a first component characterized by a first phase, and a second component characterized by a second phase, the system comprising: B. a first sensor for providing a first approximate flow measurement for the fluid mixture; C. a second sensor disposed at a known orientation relative to the first sensor, for providing a second flow measurement for the fluid mixture; and D. a processor for computing the two phase flow rate of the fluid mixture using the concentration ratio, the first flow measurement, and the second

flow measurement; wherein the two phase flow rate is related to the concentration ratio and to the first and second flow measurements by a known relationship. Letton fails to teach a tomography system for determining the concentration ratio between the first component and the second component within the fluid mixture. Fan et al teaches, in the abstract and col. 9, lines 1 and 2, a new image reconstruction technique for imaging two-and three-phase flows using electrical capacitance tomography; and a method for obtaining a cross-sectional image of a two-phase fluid flowing through a conduit. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to used the image reconstruction technique of Fan et al in the apparatus of Letton for the purpose of capturing the real time data of the turbulent fluctuation in the flow field (col. 1, lines 48-50, Fan et al).

Regarding claim 14, Letton teaches the first and second sensors each comprise: a. a transmitter for transmitting a wave through the fluid mixture; and b. a receiver for detecting the transmitted wave (col. 3, lines 47-54).

Regarding claim 15, Letton teaches the two phase flow rate is a function of the direction and speed of transmission of the energy (col. 3, lines 11 –62).

Regarding claim 16, Letton teaches the first and the second sensors comprise at least one of: an ultrasound sensor; a pressure sensor; and a thermal sensor (col. 3, line 48).

Regarding claim 17, Letton teaches the energy comprises at least one of: a) an ultrasound wave; b) a pressure wave; and c) a thermal wave (col. 3, lines 51-55).

Regarding claim 21, Letton teaches the first and second ultrasound sensor each comprises: an ultrasound transmitter for generating an ultrasound wave and transmitting it through the fluid mixture, and an ultrasound receiver for receiving the ultrasound wave (col. 3, lines 47-55).

Regarding claim 22, Letton fails to teach the tomography system comprises an ECT (Electrical Capacitance Tomography) system for providing a distribution of dielectric permittivity within the vessel by measuring the electrical capacitances between one or more pairs of electrodes placed around the vessel. Fan et al teaches a new image reconstruction technique for imaging two-and three-phase flows using electrical capacitance tomography (abstract) and teaches in col. 4, lines 29-31, the measured capacitance is a function of the dielectric constant permittivity filling the space between the electrodes in the pair. It would have been obvious to one of ordinary skill in the art at the time that the invention was made to used the ECT (Electrical Capacitance Tomography) measurement technique and well as the process of measuring the dielectric constant permittivity filling of Fan et al in the apparatus of Letton for the purpose of determining the ratios of the phases in the fluid flow and for the purpose of capturing the real time data of the turbulent fluctuation in the flow field (col. 1, lines 48-50, Fan et al).

Regarding claim 23, Letton teaches the vessel is characterized by a tubular configuration (fig. 1A).

Claim Rejections - 35 USC § 103

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Letton in view of Fan et al as applied to claim 1 above, and further in view of Yang et al (6,668,619).

Regarding claim 8, Letton in view of Fan et al fail to teach the transducer sensor comprises a pressure sensor, and the wave comprises a pressure wave. Yang et al teach pressure sensors (26) and pressure waves (col. 7, lines 65-67). It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the pressure sensors and analyzing the pressure wave as that of Yang et al in the apparatus of Letton for the purpose of precisely locating the leak on the pipelines

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Letton in view of Fan et al as applied to claim 13 above, and further in view of Fincke (6,546,811).

Regarding claim 24, Letton in view of Fan et al fails to teach the vessel includes at least one bend. Fincke teaches a multiphase flow having a bend (fig. 2, 172). It would have been obvious to one of ordinary skill in the art at the time that the invention was made to have used the vessel having the bend of Fencke in the apparatus of Letton for the purpose of providing a venturi construction (col. 7, line 29, Fincke), which allows the flow to speed up

Allowable Subject Matter

6. Claims 10, 11, 19 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jewel V Thompson whose telephone number is 571-272-2189. The examiner can normally be reached on 7-4:30, off alternate Mondays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jewel V. Thompson

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